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Please cite this paper as:

Huerta, M. and F. Borgonovi (2010), "Education, Alcohol Use and Abuse Among Young Adults in Britain", *OECD Education Working Papers*, No. 50, OECD Publishing. http://dx.doi.org/10.1787/5kmbqvsh57g0-en

OECD Education Working Papers
No. 50

Education, Alcohol Use and Abuse Among Young Adults in Britain

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Unclassified **EDU/WKP(2010)13**

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development **01-Jul-2010**

English, French

DIRECTORATE FOR EDUCATION

EDU/WKP(2010)13
Unclassified

EDUCATION, ALCOHOL USE AND ABUSE AMONG YOUNG ADULTS IN BRITAIN

Education Working Paper No.50

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JT03286393

English, French

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ACKNOWLEDGEMENT

The views expressed in this paper belong to the authors and do not represent the views of the Organisation for Economic Co-operation and Development. The authors would like to thank Koji Miyamoto, Tom Schuller, Beatrice d'Hombres and participants to the CERI Experts' Group meeting on the Social Outcomes of Learning for helpful comments on previous draft of this research and Ludovica Gambaro for her help with the data.

ABSTRACT

In this article we explore the relationship between education and alcohol consumption. We examine whether the probability of abusing alcohol differs across educational groups. We use data from the British Cohort Study, a longitudinal study of one week's birth in Britain in 1970. Measures of alcohol abuse include alcohol consumption above NHS guidelines, daily alcohol consumption and problem drinking. Higher educational attainment is associated with increased odds of daily alcohol consumption and problem drinking. The relationship is stronger for females than males. Individuals who achieved high test scores in childhood are at a significantly higher risk of abusing alcohol across all dimensions. Our results also suggest that educational qualifications and academic performance are associated with the probability of belonging to different typologies of alcohol consumers among women while this association is not present in the case of educational qualifications and is very weak in the case of academic performance among males.

RESUMÉ

Dans cet article, nous explorons le rapport entre l'éducation et la consommation d'alcool. Nous analysons si la probabilité de consommer de l'alcool de façon abusive diffère en fonction du niveau d'éducation. Nous utilisons des données de la British Cohort Study, une étude longitudinale menée pendant une semaine en Grande-Bretagne dans les années 70. L'évaluation de l'abus d'alcool inclut la consommation d'alcool située au dessus des normes NHS, la consommation quotidienne d'alcool et les problèmes d'alcoolisme. Le niveau d'éducation supérieur est associé à des risques accrus de consommation quotidienne d'alcool et à des problèmes avec l'alcool. La relation est plus forte chez les femmes que chez les hommes. Les individus qui obtiennent des notes élevées dans leur enfance ont significativement plus de risques d'avoir des problèmes avec l'alcool. Nos résultats suggèrent également que le niveau d'études ainsi que les performances scolaires augmentent les risques pour les femmes d'appartenir à ces différentes catégories de consommateurs d'alcool, alors que chez les hommes, le risque de consommation n'est pas lié au niveau d'éducation et est très faible en cas de performances scolaires élevées.

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Introduction

1. The United Kingdom has one of the highest levels of alcohol consumption among OECD countries and it is one of few countries where alcohol consumption increased in the past 25 years (OECD, 2007; NHS, 2008). Moderate drinking is not harmful and may have health and social benefits (Stampfer, 2005; Bray, 2005), but alcohol abuse is a public health concern with considerable social and economic costs. Individuals who abuse alcohol face a higher risk of suffering from cancer, liver cirrhosis, lung and cardiovascular disease, mental and behavioral disorders (Anderson et al., 1993; Byrne et al., 2004; NHS, 2008). They are more likely to experience injuries and accidents, to engage in violent acts, antisocial behavior (Rolfe et al., 2006) and have lower productivity at work (Jones et al., 1995). Alcohol abuse is also partially responsible for risky sexual practices which may lead to unwanted pregnancies and sexually transmitted diseases, as well as foetal abnormalities (Cooper, 2002).

2. Research indicates that the relationship between education and drinking differs across genders, age groups and context (Bloomfield et al., 2005; Jefferis et al., 2008) but also that it depends on whether alcohol use or abuse are considered as outcomes. For example, better educated individuals appear to be somewhat more likely to engage in some forms of risky behaviours such as consuming alcohol but better at managing such behaviours by stopping or keeping consumption low before problems escalate (Cutler and Lleras-Muney, 2006; Webbink, et al. 2008). Similarly, research indicates that education may be positively associated with how frequently individuals drink but negatively with heavy drinking (Bloomfield et al., 2005; Casswell et al., 2003; Caldwell et al., 2008).

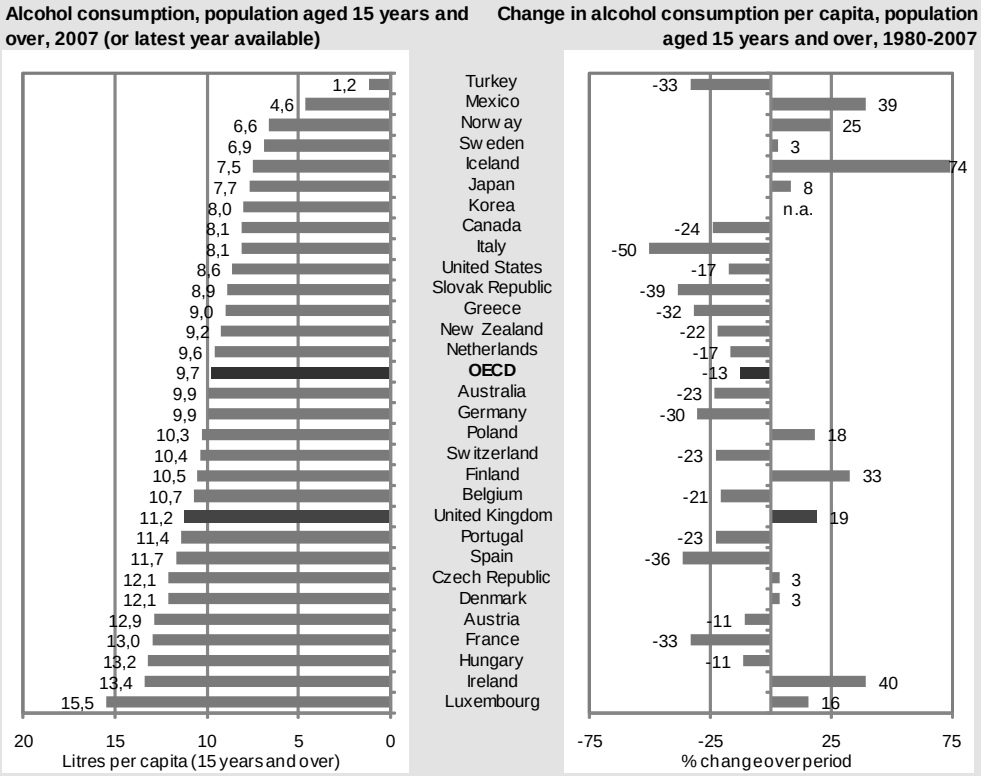
Box: Alcohol consumption in the UK is higher than the OECD average

Between 1980 and 2007, levels of alcohol consumption in OECD countries declined substantially, with an average drop of 13%. However, the amount of alcohol consumed remains high, with a yearly per capita consumption of almost 10 litres of pure alcohol (OECD 2009). Moreover, in some countries, notably Finland, Iceland, Ireland, Japan, Luxembourg, Mexico, Norway and the UK, alcohol consumption increased over the same period (OECD 2009)

With 11.2 litres per adult, annual alcohol sales in the UK stand at higher levels than the OECD average (Figure 1). In addition, recent estimates for England show that the rise in alcohol consumption has resulted in an increase of 19% in the number of alcohol related deaths between 2001 and 2006; a doubling of hospital admissions between 1995 and 2006, and a 20% increase in the number of prescriptions to treat alcohol dependency in the last 4 years (NHS 2008).

Changes in overall intake figures mask large differences across different population subgroups. More specifically, the increase in alcohol consumption in the UK to a large extent has been driven by an increase in women's consumption. Findings from the Health Survey for England (HSE) indicate that, while the proportion of men drinking more than 21 units of alcohol per week has not changed much (remaining at approximately 30% since the early 1990s), the proportion of women drinking more than 14 units of alcohol per week has shown a noticeable increase, going from 12% in 1992 to 18% in 2002 (estimates using HSE data).

Alcohol consumption in OECD countries 1980-2007



Source: OECD (2009).

3. In general, findings of studies examining the education-alcohol consumption link differ widely (Sander, 1999; Droomers et al., 1999; Hatch et al., 2007). Variations in estimates of the direction and strength of the association mirror results of research examining social class differentials in alcohol consumption (Casswell et al., 2003; Caldwell et al., 2008). Although some studies show that individuals from low socio-economic backgrounds tend to consume more alcohol compared with their better off peers (Leigh, 1996; Kuntsche et al., 2004, Mossakowski, 2008), others suggest that the opposite may be true (Ornstein and Hanssens, 1985; Grossman et al., 1995; NHS, 2008; Maggs et al., 2008).

4. The literature overwhelmingly indicates that better educated individuals are less likely to lead unhealthy lifestyles with respect to smoking, diet and exercise. However, as indicated above, the evidence is far from consistent in the case of alcohol consumption. The aim of this paper is to empirically examine the association between education and alcohol consumption using multiple indicators of alcohol abuse, but also developing previous research examining the educational gradient in patterns of alcohol use to assess when more schooling promotes a healthy relationship with alcohol and when it may lead to greater alcohol abuse. We exploit data from the British Cohort Study, a longitudinal survey containing detailed information on a large sample of individuals born in Britain in 1970 and measure education using individuals' highest educational attainment and test scores in childhood.

5. The manuscript is structured as follows: first, it examines hypotheses on the relationship between education and alcohol use and abuse. Next, it describes data and methods and presents results. Finally, it discusses conclusions.

The relationship between education and drinking behaviours

6. Schooling and health status are highly associated and recent studies indicate that this association can be considered the result of underlying causal effects (Grossman, 2006; Cutler et al., 2008). New evidence also supports the view that education plays an important role in influencing health related behaviours such as smoking, poor nutrition and lack of physical activity (de Walque, 2007; Grimard and Parent, 2007; Cutler and Lleras-Muney, 2006).

7. Education may make a positive contribution to health status and behaviours for several reasons. More education generally translates into greater access to better information, and greater processing abilities to act upon such information (Brunello, 2008; Goldman and Smith, 2005). Secondly, education may alter risk perceptions and may render individuals more likely to invest in their health. Education has a significant impact on wages and the ability to purchase health enhancing goods and products. Finally, education may shape people's life chances and contribute to establishing conditions that are conducive to different patterns of alcohol consumption. While the direct effects of education on information and risk perceptions are likely to be common across different health behaviours, the indirect effects of education may play out very differently in different health behaviours.

8. Education may promote different patterns of alcohol consumption by fostering skill acquisition and knowledge development, but also by influencing labour market opportunities and the social context in which individuals operate. Social context may in fact be a key determinant of choices over whether and how much alcohol individuals consume. More educated individuals in fact are not only more likely to have a higher level of cognitive abilities, skills and knowledge, but are also less likely to be unemployed (Hobcraft, 2000), face financial difficulties (Blundell, 2000), lack social support, suffer from mental health problems (Ross and van Willigen, 1997) and have more to lose from engaging in excessive alcohol consumption than the less educated (Cowell, 2006).

9. In general however, although better educated individuals are more likely to have greater knowledge about the risks of abusing alcohol (Kenkel, 1991), they face fewer financial constraints and may be exposed to working environments where drinking is acceptable and often expected. Contrary to smoking, which is generally perceived as unacceptable and is disapproved, especially in better educated environments, alcohol consumption is often an integral part of social life in working environments where the better educated operate. Finally, lack of social stigma and working environments that encourage consumption, an active social life and a high sense of self-control may lead better educated individuals to have more frequent and possibly heavier drinking sessions than then their less educated peers.

Data and Methods

Data

10. We use data from the British Cohort Study (BCS)[1], a longitudinal study of all children born in Great Britain in a particular week in 1970. Cohort members were surveyed shortly after birth, and then again as youngsters, teenagers and adults. Detailed information on drinking behaviours was gathered at ages 30 and 34 (years 2000 and 2004) from face-to-face interviews and self-completion questionnaires. We carry out analyses using information collected at age 34 and complement it with information gathered at previous sweeps. The first sweep gathered information on 17,287 cohort members; however our final sample size is smaller (9,665 cohort members) because of attrition, item non-response or don't know answers.

[1] For information on the British Cohort Study see:http://www.cls.ioe.ac.uk/studies.asp?section=000100020002

11. Attrition analyses of BCS have suggested that, even when cumulative attrition is high, especially among disadvantaged groups, it does not affect the representativeness of the data (Nathan, 1999). Nevertheless, to ensure that results are not affected by non-response bias, for each variable included in the analyses, we introduce a variable indicating whether information on such variable was missing for a particular respondent. Table 1 shows descriptive statistics for all variables.

Table 1. Distribution of outcome and explanatory variables

	% of Male Sample	% of Female Sample	P>|z|	Total
Outcome variables				
Quantity				
Above health recommendations	27.2	11.6	**	19.1
Frequency				
On most days	22.2	11.8	**	16.8
CAGE variables				
Cut down on your drinking	40.9	27.2	**	33.8
Annoyed by criticism	12.2	6.3	**	9.1
Guilty feelings	21.6	13.9	**	17.6
Drink first thing in the morning	6.4	1.4	**	3.8
CAGE				
Two or more positive answers	23.3	13.6	**	18.3
Explanatory variables				
Educational attainment (age 34)				
No qualifications	10.4	7.8	**	9.4
Secondary	49.0	47.8		48.1
Advanced	9.1	9.3		9.2
Degree or more	31.5	35.1	**	33.3
Test scores (ages 5 and 10)				
Low	20.5	22.1	*	21.3
Medium	49.7	50.9		50.3
High	29.8	27.1	*	28.5
Other background variables				
Social class (age 34)				
No class reported	7.3	25.7	**	16.9
Non-manual	53.2	58.5	**	55.9
Manual	39.5	15.8	**	27.1
Net pay (quartiles) and not employed (age 34)				
Not employed	8.7	27.8	**	19.1
First quartile	6.7	31.6	**	20.3
Second quartile	22.7	18.2	**	20.3
Third quartile	29.5	13.6	**	20.8
Fourth quartile	32.3	8.8	**	19.5
Partnership (age 34)				
Married or cohabiting	73.6	75.5	*	74.5
Not living w/someone	26.4	24.5	*	25.5
Number of children (age 34)				
None	71.7	64.0	**	67.7
One	21.4	27.7	**	24.7
Two or more	6.8	8.3	**	7.6

	% of Male Sample	% of Female Sample	P>|z|	Total
Malaise (age 30)				
Yes	5.4	7.8	**	6.8
Smoking (age 34)				
Has never smoked	43.6	46.5	**	45.1
Ex-smoker	22.8	24.2		23.5
Occasional smoker	7.3	6.2	*	6.7
Daily smoker	26.2	23.2	**	24.6
Father's education (age 10)				
No qualifications	34.2	35.9		35.5
Some qualification	51.4	50.0		50.4
Degree +	14.4	14.0		14.1
Mother's education (age 10)				
No qualifications	48.5	50.0		49.7
Some qualification	47.9	47.0		47.0
Degree +	3.7	3.1		3.3
Parental interest (age 10)				
very interested	56.6	59.0		57.7
moderately interested +	34.0	32.4		33.1
not interested	9.5	8.7		9.2
Family structure (age 10)				
Non-intact family	11.1	12.7	*	12.0
Intact family	88.9	87.3	*	88.1
Household tenure (age 10)				
Social housing	27.7	28.5		28.2
Own or privately rented	72.3	71.5		71.8
Few durables (age 10)				
Yes	73.2	72.9		27.4
No	26.8	27.2		72.6
Father's social class (age 10)				
Non-manual	43.4	42.7		42.8
Manual	56.6	57.3		57.2
Internalising problems (ages 5 and 10)				
Low	49.0	45.7	**	47.3
Medium	36.9	36.5		36.5
High	14.0	17.8	**	16.3
Externalising problems (ages 5 and 10)				
low	42.4	59.7	**	51.5
medium	44.0	34.3	**	38.8
high	13.6	6.1	**	9.8

Note: ** p<0.01, * p<0.05

Drinking behaviours

12. We assess drinking behaviours using age 34 information on frequency of consumption, weekly amounts consumed and lifetime problem drinking.

13. Cohort members were asked *"How often do you have an alcoholic drink of any kind?"* Possible responses include: 'on most days', '2 to 3 days a week', 'once a week', '2 to 3 times a month', 'less often

or only on special occasions', 'never nowadays', or 'never had an alcoholic drink'. We construct a dichotomous variable that takes value 1 if cohort members drink on most days that we use in models estimating alcohol abuse and employ the original categorical variable to examine patterns of alcohol use.

14. Participants who ever had a drink were probed for their weekly alcohol consumption. We convert responses to the following set of questions *"In the last seven days, how much beer/spirits/wine/sherry/alcopops/other alcoholic drinks have you had?"* into standard alcohol units and then sum these to obtain total units consumed in the week preceding the survey. Following Britain's Department of Health recommendations on alcohol consumption, we construct an indicator of whether cohort members drank more than the recommended weekly amount – corresponding to 21 units for males and 14 units for females – to examine alcohol abuse and a categorical measure indicating whether cohort members: 'never drink', 'drink less than 2 or 3 times a month', 'drink between 1 and 14 units of alcohol per week', 'drink between 15 and 21 units of alcohol per week', 'drink more than 21 units of alcohol per week but less than 40 units', and 'drink more than 40 units of alcohol per week' to examine alcohol use.

15. Finally, cohort members filled the Cut-down, Annoyed, Guilt and Eye-opener (CAGE) questionnaire, a screening instrument widely used to assess life-time drinking problems (Maggs et al., 2008; Caldwell et al., 2008) based on the following questions: "*Have you ever felt you should **C**ut down on your drinking?"*, "*Have people ever **A**nnoyed you by criticizing your drinking?*", "*Have you ever felt bad or **G**uilty about your drinking?*"; "*Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover (**E**ye opener)?*". Research has shown that individuals who respond positively to two or more CAGE items have life-time problem drinking (McCusker et al., 2002). However, other studies argue that a cut-off point of one has a stronger predictive power for identifying incidence of harmful drinking practices (Knight et al., 2003). We assign a value of 1 to cohort members who respond affirmatively to two or more CAGE items and carried out sensitivity checks.

Education

16. We examine the relationship between education and drinking behaviours using highest educational attainment with information gathered at age 34 and academic performance in childhood. We classify educational attainment using a categorical indicator of whether respondents did not obtain any qualification, whether they achieved O levels or fewer qualifications *(secondary level),* A levels (*advanced level*) or advanced qualifications *(degree +).*

17. We develop indicators for academic performance in childhood using scores on vocabulary and copying design tests at age 5 and on reading and mathematics tests at age 10. For each age, we standardise test scores, add them and construct quartiles. For each age, we classify cohort members in the lowest quartile as achieving low level scores, those in the middle two quartiles as obtaining middle level scores, and those in the top quartile as having high level scores. We then add values for ages 5 and 10 and reclassify resulting scores into low, middle and high level scores.

Circumstances in Adulthood

18. At age 34 we control for social class, weekly income, partnership status and number of children. We treat social class as a dichotomous variable taking value 0 when cohort members work in non-manual occupations and 1 if they are manual workers. We introduce income quartiles to characterise economic status and a variable taking value 0 when cohort members live alone and 1 if they are married or with a partner.

19. We use a malaise indicator to characterise poor mental health, a possible indirect pathway through which education may influence alcohol consumption. Cohort members were asked to complete 9

items from the Rutter scale of behaviour disorder (Rutter et al., 1970) at age 30 and 34. We use malaise at age 30 as a covariate in models estimating the probability of alcohol consumption at age 34 to attenuate reversed causation issues. We construct a variable taking value 0 if respondents report less than 4 symptoms of distress and 1 if they report 4 or more symptoms.

20. We include smoking behaviours at age 34 to account for a possible substitute/complement effect between smoking and drinking. We categorise individuals according to whether they never smoked; are ex-smokers; are occasional smokers or daily smokers.

Childhood circumstances

21. Studies highlight a strong relationship between socio-economic disadvantage in childhood and alcohol abuse (Poulton et al., 2002; Droomers et al., 2003; Hemmingsson et al., 1999; Caldwell et al., 2008). We include three indicators of socio-economic circumstances in at age 10 as well as mother's and father's education: housing tenure, absence of household durables, and social class of the cohort member's father.

22. We assess maternal and paternal interest in the education of cohort members at age 10 through a variable that takes value 1 when teachers report that at least one parent showed little or no interest. We also introduce a control aimed at indicating whether cohort members experienced a traumatic family change such as divorce, separation or death of a parent before the age of 10. Children who experience family break-ups are at an increased risk of suffering from behavioural and mental problems (Quinton and Rutter, 1988), a factor potentially associated with both educational attainment and alcohol consumption. The variable takes value 0 if the family did not experience family break-ups and 1 if they did.

23. Children with behavioural problems are less likely to have a good performance at school (Hinshaw, 1992) and tend to consume more alcohol than their peers with low conduct problems (Lynksey and Fergusson, 1995). Following the literature, we construct two measures of cohort members' behaviour in childhood using information collected from parents at ages 5 and 10: externalising and internalising behavioural problems (McCulloch et al. ,2000). We construct the first measure – externalising problems – using parental reports on the extent to which their child: (a) frequently fights with other children, (b) often destroys own or others belongings, (c) is often disobedient, (d) is squirmy or fidgety, (e) cannot settle down to anything, and (f) is very restless. Similarly we construct the variable measuring internalising problems using reports that the child: (a) often worries, (b) is miserable, unhappy, tearful, depressed, and (c) is fearful or afraid of new situations. We add the scores of all items to obtain a total sum for each behavioural measurement. We classify the total sum into three categories: low, medium and high.

Methods

24. We carry out all analyses separately for males and females because of evidence that on average men are likely to have more frequent and heavier drinking sessions than women (Droomers, 1999; Zucker, 2008).

25. Our analysis is articulated in two stages. First, we examine whether educational qualifications are associated with a reduction in the probability of alcohol abuse, which we characterise along three dimensions: amount of alcohol units consumed, frequency of drinking episodes and life-time problem drinking. Given the dichotomous nature of the alcohol abuse indicators we use logistic regression and for each outcome and specify three models: a base model, which includes educational attainment as the only covariate, a second model which includes circumstances in childhood and a third model that includes both circumstances in childhood and adulthood. We compare estimates from the first model with those from subsequent models to explore the extent to which education plays a role in promoting different patterns of

alcohol abuse through direct and indirect effects. Odds Ratios (OR) and 95% Confidence Intervals (C.I.) are presented for logistic regression analyses.

26. In the second stage we use Latent Class Analysis (LCA) to identify different typologies of alcohol consumption and use multinomial logistic regressions to examine the association between education and the probability of being in different classes of alcohol use. We adopt a procedure similar to the one developed for the analysis of alcohol abuse and regress latent class membership on educational attainment in Model 1, on educational attainment and adulthood factors in Model 2 and on educational attainment, adulthood factors and childhood characteristics in Model 3.

27. LCA is a statistical approach used to categorise individuals into different groups or "latent classes". The first step consists in identifying the number of latent classes that best fits the data and then generating probabilities, per respondent, of class membership. The second step involves the assignment of individuals to the class for which they have the highest membership probability. We examined models with a different number of classes and settled for a model based on 5 latent classes for both genders because of both formal considerations and the extent to which the number of clusters had a meaningful interpretation. We conducted all analyses using Mplus version 4.1.

Results

Education and Alcohol Abuse

28. Table 2, 3 and 4 illustrate results on the association between education and patterns of alcohol abuse along three dimensions: frequency, quantity consumed and lifetime problem drinking.

Frequency of alcohol intake

29. Results reported in Model 1 in Table 2 suggest that educational attainment is positively associated with the likelihood of having an alcoholic drink on most days among both females and males: the more educated individuals are, the more likely they are to drink on most days. The association between education and frequency of consumption weakens significantly when we include circumstances in childhood (Model 2) and adulthood (Model 3) and remains significant in the case of females while becomes statistically insignificant for males. Women with some educational qualifications have greater odds of drinking on most days than women without qualifications (OR=1.71 for secondary level, OR=01.72 for advanced level and OR=1.86 for degree level qualifications). Additionally, we observe that academic performance is positively associated with frequency of alcohol consumption. Table 2 shows that women with medium or high level test scores in childhood are more likely to take a drink on most days of the week (OR=2.13 and OR=1.59) than women with poor academic performance. The same is true for males, although the relationship is weaker and is statistically significant only for the high performing group (OR=1.49).

Table 2. Patterns of alcohol use – Frequency: on most days

	Females						Males					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	OR	(C.I.)	OR	(C.I.)	OR	(C.I.)	OR	(C.I.)	OR	(C.I.)	OR	(C.I.)
Educational attainment												
Reference: No Qualifications												
Secondary level	2.05**	(1.3, 3.3)	1.72*	(1.1,2.8)	1.71*	(1.1, 2.8)	1.04	(0.8, 1.3)	0.96	(0.7, 1.2)	1.02	(0.8, 1.3)
Advanced level	2.54**	(1.5, 4.3)	1.82*	(1.1, 3.2)	1.72	(1, 3.0)	0.94	(0.7, 1.3)	0.77	(0.7, 1.4)	0.83	(0.6, 1.2)
Degree +	3.46**	(2.2, 5.5)	2.21**	(1.4,3.6)	1.86*	(1.1, 3.1)	1.40**	(1.1, 1.8)	1.01	(0.7, 1.3)	1.10	(0.8, 1.5)
Test scores												
Reference: Low												
Medium			1.67**	(1.1,2.5)	2.13**	(1.4, 3.3)			1.15	(0.9, 1.5)	1.11	(0.8, 1.5)
High			2.1**	(1.4,3.1)	1.59*	(1.1, 2.4)			1.6**	(1.2, 2.1)	1.49**	(1.1, 2.0)
Observations	4857		4854		4854		4507		4506		4506	

Standard errors in parentheses; ** p<0.01, * p<0.05

OR= Odds Ratios C.I.= Confidence Intervals

Model 2 controls for childhood circumstances: cohort member's test scores, parent's education, parental interest, family structure, father's social class, housing tenure, few durables, behavioural adjustment

Model 3 As above plus adulthood predictors: social class, weekly income, partnership status, number of children, smoking and malaise

Quantity of alcohol intake

30. Parameter estimates for quantity of alcohol consumed presented in Table 3 suggest that both for males and females, educational attainment is not associated with drinking more units than the maximum recommended. On the other hand, our estimates indicate that academic performance in childhood is positively and significantly associated with alcohol consumption above recommended amounts and that this association is stronger for females than males (OR=1.75 and OR=1.90 for females and OR=1.08 and OR=1.44 for males).

Life-time problem drinking

31. Results in Table 4 indicate that for males, obtaining some academic qualifications is not associated with having problematic alcohol consumption (OR close to one not statistically significant). Contrary to findings for the male sample, the association between educational qualifications and problem drinking is statistically significant for females with the highest qualifications (OR=1.71). Even after controlling for circumstances in childhood and adulthood in Models 2 and 3, women with a degree are more likely to have problem drinking than their peers without qualifications. In line with findings reported for frequency of consumption and quantity consumed, results in Table 4 suggest that academic test scores are associated with lifetime problem drinking (OR=1.74 and OR=1.49 for females and OR=1.20 and OR=1.73 for males).

Table 3. Patterns of alcohol use – Quantity

	Females quantity: > 14 alcohol units						Males quantity: > 21 alcohol units					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	OR	(C.I.)	OR	(C.I.)	OR	(C.I.)	OR	(C.I.)	OR	(C.I.)	OR	(C.I.)
Educational attainment												
Reference: No Qualifications												
Secondary level	1.08	(0.7, 1.5)	1.03	(0.7, 1.5)	1.07	(0.7, 1.6)	0.91	(0.7, 1.1)	0.89	(0.7, 1.1)	1.00	(0.8, 1.3)
Advanced level	1.36	(0.8, 2.1)	1.23	(0.8, 1.9)	1.24	(0.8, 2.0)	0.68*	(0.5, 0.9)	0.62**	(0.4, 0.8)	0.75	(0.5, 1.0)
Degree +	1.20	(0.8, 1.7)	1.05	(0.7, 1.6)	0.98	(0.6, 1.5)	0.84	(0.7,1.0)	0.72*	(0.6,0.9)	0.90	(0.7, 1.2)
Test scores												
Reference: Low												
Medium			1.79*	(1.3,2.5)	1.75**	(1.2, 2.5)			1.07	(0.8, 1.4)	1.08	(0.8, 1.4)
High			1.99*	(1.4,2.9)	1.90**	(1.3, 2.8)			1.38*	(1.1, 1.8)	1.44**	(1.1, 1.9)
Observations	4861		4847		4847		4507		4506		4506	

Standard errors in parentheses; ** p<0.01, * p<0.05

OR= Odds Ratios C.I.=Confidence Intervals

Model 2 controls for childhood circumstances: cohort member's test scores, parent's education, parental interest, family structure, father's social class, housing tenure, few durables, behavioural adjustment

Model 3 As above plus adulthood predictors: social class, weekly income, partnership status, number of children, smoking and malaise

Table 4. Patterns of alcohol use – Problem Drinking

	Females						Males					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	OR	(C.I.)	OR	(C.I.)	OR	(C.I.)	OR	(C.I.)	OR	(C.I.)	OR	(C.I.)
Educational attainment												
Reference: No Qualifications												
Secondary level	1.01	(0.7, 1.4)	0.99	(0.7, 1.4)	1.12	(0.8, 1.6)	0.90	(0.7, 1.1)	0.88	(0.7, 1.1)	1.05	(0.8, 1.4)
Advanced level	1.44	(0.9, 2.2)	1.32	(0.9, 2.0)	1.49	(0.9, 2.3)	0.89	(0.7, 1.2)	0.83	(0.6, 1.1)	1.02	(0.7, 1.4)
Degree +	1.77**	(1.3, 2.5)	1.53*	(1.1, 2.2)	1.71**	(1.1, 2.5)	1.02	(0.8, 1.3)	0.91	(0.7, 1.2)	1.12	(0.8, 1.5)
Test scores												
Reference: Low												
Medium			1.50*	(1.2, 2.6)	1.74**	(1.2, 2.6)			1.16	(0.9, 1.5)	1.20	(0.9, 1.6)
High			1.94**	(1.1, 2.1)	1.49*	(1.1, 2.1)			1.66**	(1.3, 2.1)	1.73**	(1.3, 2.3)
Observations	4857		4854		4854		4501		4500		4500	

Standard errors in parentheses; ** p<0.01, * p<0.05

OR= Odds Ratios C.I.= Confidence Intervals

Model 2 controls for childhood circumstances: cohort member's test scores, parent's education, parental interest, family structure, father's social class, housing tenure, few durables, behavioural adjustment

Model 3 As above plus adulthood predictors: social class, weekly income, partnership status, number of children, smoking and malaise

Constructing Typologies of Alcohol Consumers

32. We identify five typologies of alcohol consumers using LCA: "Abstainers", "Light Drinkers", "Medium-level drinkers", "Regular heavy drinkers without problems" and "Regular heavy drinkers with problems" (see Table 5 for goodness of fit measures). Individuals belonging to the "Regular heavy drinkers with and without problems" groups are more likely to report frequent consumption of alcohol compared to members of other clusters. More than 30% of women and 40% of men in the "regular heavy drinkers" clusters report having an alcoholic drink on most days. In contrast, no abstainers or light drinkers consume an alcoholic drink on most days. Similarly, while almost 40 % of women and 50 % of men in the "regular heavy drinkers" clusters report drinking more alcoholic units than the recommended maximum intake, none of the cohort members in the abstainer and light drinkers clusters do so. Cohort members classified as "regular heavy drinkers with problems" are more likely than others to report problem drinking. The great majority (around 95% of both women and men) have felt that they should cut down their drinking; more than one-third (35% of women and 37% of men) have been annoyed by criticisms regarding their drinking; around 90% have felt guilty; and many have had a drink first thing in the morning (5% of women and 17% of men).

33. Findings highlight a higher prevalence of heavy drinking among men than among women, while the proportion of heavy drinkers that experiences problems is fairly similar across genders. Our estimates suggest that almost one out of six men and one in ten women consume an alcoholic drink on most days, consume more recommended amounts, and face life-time drinking problems. Most females can be considered medium-level drinkers (42%), sizeable proportions are heavy and light drinkers (respectively 29% and 24%) while only a minority is constituted by abstainers (5%). Among the regular heavy drinkers, approximately 60% do not experience problems. Although medium-level drinking is also the most prevalent form of alcohol use among men, over 40% of males are regular heavy drinkers and, similar to females, 6 in 10 do not experience problems. Light drinkers and abstainers constitute only a minority among young males (12% and 3%).

Table 5. Goodness of fit indices Latent Class Analysis

Classification for Female sub-sample					
	BIC	**L^2**	**p-value**	**Class.Err.**	**Entropy**
2-Cluster	36031.8	4192.2	0.00	0.01	0.97
3-Cluster	34187.7	2220.7	0.00	0.06	0.87
4-Cluster	32886.9	792.7	0.00	0.05	0.89
5-Cluster	32828.8	607.2	0.00	0.10	0.81
6-Cluster	32801.1	452.2	0.86	0.10	0.81
7-Cluster	32896.5	420.2	0.96	0.15	0.82
8-Cluster	32852.3	248.8	1.00	0.15	0.85
Classification for Male sub-sample					
	BIC	**L^2**	**p-value**	**Class.Err.**	**Entropy**
2-Cluster	41208.3	3812.4	0.00	0.09	0.71
3-Cluster	39419.8	1897.7	0.00	0.08	0.80
4-Cluster	38799.6	1151.2	0.00	0.07	0.77
5-Cluster	38554.7	780.1	0.00	0.11	0.80
6-Cluster	38407.3	506.5	0.25	0.16	0.74
7-Cluster	38454.7	427.8	0.92	0.15	0.73
8-Cluster	38528.8	375.7	1.00	0.18	0.70

Education and Patterns of Alcohol Use

34. Tables 6 and 7 illustrate findings from multinomial logistic regressions on the association between education and the probability of belonging to different classes of alcohol consumption. We report relative risk ratios, robust standard errors and the level of significance for each parameter. The multinomial logit model estimates *k-1* models, where *k* is the number of clusters and the k^{th} equation specifies how the probability of being in cluster *k* relative to being in the reference group changes as a function of different controls. We specify a model to estimate factors associated with membership in the 5 clusters derived from LCA and specify the cluster "Medium-level drinkers" as the reference group.

35. Table 6 indicates that highly educated females are significantly less likely to be abstainers and light drinkers than to be moderate drinkers, while no significant difference across educational groups emerges when comparing medium-level drinkers with regular heavy drinkers without problems and regular heavy drinkers with problems. The inclusion of controls for circumstances in childhood and adulthood somewhat reduces the strength of the association between educational qualifications and not consuming or consuming alcohol lightly, but this remains statistically significant. Results presented in Model 3 highlight how women who achieved a degree or higher qualifications are less likely to be abstainers than medium-level drinkers (RRR=0.58) and how the relationship between educational qualifications and being light drinker vs. medium-level drinker is strongest for the highest qualifications (RRR=0.63 for secondary level qualifications, RRR=0.63 for advanced level qualifications and RRR=0.49 for degree). We also find that women with better performance in academic test scores are more likely than women with a poor performance to have problematic alcohol consumption.

36. Table 7 presents estimates for males. Contrary to findings for females, once we control for circumstances in adulthood educational qualifications are not associated with different patterns of alcohol use. Men with high performance in test scores are significantly more likely to be regular heavy drinkers with problems than to be medium-level drinkers (RRR=1.72).

Table 6. Patterns of Alcohol Use - Females

	Abstainer		*Light drinker*		*Regular-heavy drinker w/out probs*		*Regular-heavy drinker with probs*	
	RRR	**(C.I.)**	**RRR**	**(C.I.)**	**RRR**	**(C.I.)**	**RRR**	**(C.I.)**
Model 1								
Educational attainment								
Reference: No Qualifications								
Secondary level	0.45**	(0.3, 0.7)	0.49**	(0.4, 06)	0.91	(0.6, 1.3)	0.88	(0.6, 1.3)
Advanced level	0.52*	(0.2, 0.9)	0.40**	(0.3, 0.6)	1.06	(0.7, 1.7)	1.20	(0.7, 2.0)
Degree +	0.35**	(0.2, 0.6)	0.28**	(0.2, 0.4)	1.33	(0.9, 1.9)	1.38	(0.9, 2.1)
Model 2								
Educational attainment								
Reference: No Qualifications								
Secondary level	0.51**	(0.3, 0.8)	0.57**	(0.4, 0.7)	0.86	(0.6, 1.3)	0.88	(0.6, 1.4)
Advanced level	0.69	(0.4, 1.2)	0.52**	(0.4, 0.7)	0.92	(0.6, 1.5)	1.11	(0.7, 1.8)
Degree +	0.48**	(0.3, 0.8)	0.39**	(0.3, 0.5)	1.07	(0.7, 1.6)	1.23	(0.8, 1.9)
Test scores								
Reference: Low								
Medium	0.90	(0.6, 1.3)	0.88	(0.7, 1.1)	1.10	(0.8, 1.5)	1.60*	(1.1, 2.3)
High	0.70	(0.4, 1.2)	0.74*	(0.6, 1.0)	1.32	(0.9, 1.8)	2.15**	(1.4, 3.3)
Model 3								
Educational attainment								
Reference: No Qualifications								
Secondary level	0.58*	(0.4, 0.9)	0.63**	(0.5, 0.8)	0.88	(0.6, 1.3)	1.02	(0.7, 1.6)
Advanced level	0.82	(0.4, 1.5)	0.63**	(0.4, 0.9)	0.91	(0.6, 1.5)	1.29	(0.8, 2.2)
Degree +	0.58*	(0.3, 1.0)	0.49**	(0.4, 0.7)	0.98	(0.7, 1.5)	1.38	(0.9, 2.2)
Test scores								
Reference: Low								
Medium	0.92	(0.6, 1.4)	0.92	(0.7, 1.2)	1.07	(0.8, 1.5)	1.59*	(1.1, 2.4)
High	0.73	(0.4, 1.2)	0.78*	(0.6, 1.0)	1.26	(0.9, 1.8)	2.17**	(1.4, 3.3)
Observations	4861		4861		4861		4861	

Standard errors in parentheses; ** p<0.01, * p<0.05

RRR= Relative Risk Ratios C.I.= Confidence Intervals

Model 2 controls for childhood circumstances: cohort member's test scores, parent's education, parental interest, family structure, father's social class, housing tenure, few durables, behavioural adjustment.

Model 3 As above plus adulthood predictors: social class, weekly income, partnership status, number of children, smoking and malaise.

Table 7. Patterns of Alcohol Use – Males

	Abstainer		*Light drinker*		*Regular-heavy drinker w/out probs*		*Regular-heavy drinker with probs*	
	RRR	**(C.I.)**	**RRR**	**(C.I.)**	**RRR**	**(C.I.)**	**RRR**	**(C.I.)**
Model 1								
Educational attainment								
Reference: No Qualifications								
Secondary level	0.60*	(0.4, 1.0)	0.56**	(0.4, 0.7)	1.02	(0.8, 1.3)	0.78	(0.6, 1.0)
Advanced level	0.49*	(0.2, 1.0)	0.68*	(0.5, 1.0)	0.97	(0.7, 1.4)	0.65*	(0.4, 1.0)
Degree +	0.46**	(0.3, 0.8)	0.43**	(0.3, 0.6)	1.12	(0.8, 1.5)	1.00	(0.8, 1.3)
Model 2								
Educational attainment								
Reference: No Qualifications								
Secondary level	0.74	(0.4, 1.3)	0.64**	(0.5, 0.9)	1.04	(0.8, 1.4)	0.76	(0.6, 1.0)
Advanced level	0.67	(0.3, 1.5)	0.90	(0.6, 1.4)	0.90	(0.6, 1.3)	0.59*	(0.4, 0.9)
Degree +	0.62	(0.3, 1.2)	0.64**	(0.4, 0.9)	0.96	(0.7, 1.3)	0.86	(0.6, 1.2)
Test scores								
Reference: Low								
Medium	0.78	(0.4, 1.4)	0.85	(0.6, 1.2)	1.00	(0.8, 1.3)	1.22	(0.9, 1.7)
High	0.91	(0.5, 1.8)	0.68*	(0.5, 1.0)	1.23	(0.9, 1.7)	1.65	(1.2, 2.3)
Model 3								
Educational attainment								
Reference: No Qualifications								
Secondary level	1.13	(0.7, 2.0)	0.74	(0.5, 1.0)	1.17	(0.9, 1.6)	0.93	(0.7, 1.2)
Advanced level	1.10	(0.5, 2.5)	1.02	(0.7, 1.6)	1.07	(0.7, 1.6)	0.75	(0.5, 1.1)
Degree +	1.06	(0.5, 2.1)	0.75	(0.5, 1.1)	1.20	(0.9, 1.7)	1.10	(0.8, 1.6)
Test scores								
Reference: Low								
Medium	0.82	(0.5, 1.5)	0.87	(0.6, 1.2)	0.99	(0.7, 1.3)	1.26	(0.9, 1.7)
High	1.06	(0.5, 2.1)	0.71	(0.5, 1.0)	1.25	(0.9, 1.7)	1.72*	(1.2, 2.5)
Observations	4507		4507		4507		4507	

Standard errors in parentheses; ** p<0.01, * p<0.05

Model 2 controls for childhood circumstances: cohort member's test scores, parent's education, parental interest, family structure, father's social class, housing tenure, few durables, behavioural adjustment.

Model 3 As above plus adulthood predictors: social class, weekly income, partnership status, number of children, smoking and malaise.

Conclusions

37. Given the documented positive influence that education has on health status and behaviours such as smoking, diet and exercise, we examine whether more educational qualifications and academic performance are associated with a reduction in alcohol abuse and whether education might promote moderate alcohol use. We used data from the British Cohort Study, a longitudinal survey containing information on a large sample of individuals born in Britain in 1970. The advantage of using a large cohort study is that we are able to control for circumstances in childhood and adulthood that could potentially bias estimates of the relationship between education and alcohol consumption. Moreover, the richness of the information in the BCS study allows us to attempt to identify whether the association between education and alcohol consumption is mostly due to skill acquisition and knowledge accumulation or to labour market performance, social position and social integration.

38. Two notes of caution on our findings are warranted. First, estimates should be considered as indicative of associations rather than causal effects since we cannot completely eliminate individual heterogeneity and reverse causality problems. Second, our data do not lend to immediate generalisation since they refer to the drinking behaviours in 2004 of individuals born in Britain in 1970 and therefore reflect the experiences of individuals of a specific age, born in a specific year and living in a specific context – both geographically and temporally defined.

39. Our analysis is articulated into two stages to recognise that the relationship between education and drinking may vary across dimensions. First, we examine the association between education and three measures of consumption that are indicative of alcohol abuse – consuming alcohol on most days, drinking more than recommended amounts and problematic consumption. Then, we use information on frequency, amounts consumed and alcohol-related problems to assess education's influence over patterns of alcohol use.

40. Our results confirm previous evidence on the positive association between educational qualifications and alcohol abuse in England (Jefferis et al., 2007; Jefferis et al., 2008; Caldwell et al., 2008; Maggs, 2007) and highlight strong gender differences. For females we do not find any association between education and consumption over recommended amounts but estimate a strong positive association between educational attainment and frequency of alcohol consumption and life-time drinking problems: the more educated women are, the more likely they are to drink alcohol on most days and to report having problems due to their drinking patterns.

41. Educational attainment however does not appear to be associated with alcohol abuse along any of the three dimensions examined among males, possibly because the study does not consider binge drinking, a form of abuse in which less educated men may be more likely to indulge. Our study shows a positive association between alcohol abuse and another aspect of the educational experience: schooling performance in childhood. Both males and females who achieved high level performance in test scores administered at ages 5 and 10 are significantly more likely to abuse alcohol along all dimensions than individuals who performed poorly on those tests. Results where we examine the relationship between education and patterns of alcohol use also clearly identify major differences across genders. While women's educational attainment and academic performance are associated with the probability of belonging to different typologies of alcohol consumers, this association is not present in the case of educational qualifications and is very weak in the case of academic performance among males.

42. We find that a substantial part of the "educational effect", especially among women, occurs because of the way in which educational attainment shapes social position and opportunities in life and by so doing promotes circumstances that favour alcohol consumption (Månsdotter et al., 2008). Knowledge accumulation and skill acquisition appear to play only a marginal role in promoting frequent consumption. Reasons for the positive association of education and drinking behaviours may include: a more intensive social life that encourages alcohol intake; a greater engagement into traditionally male spheres of life, a greater social acceptability of alcohol use and abuse; more exposure to alcohol use during formative years; greater postponement of childbearing and its responsibilities among the better educated, and smaller underreporting. Although at the time being we observe that better educated women are more likely to abuse alcohol than their less educated counterparts, it is possible that women from more privileged backgrounds will eventually lead the way into healthier drinking behaviours as was the case for smoking (Graham, 1999).

43. An important limit of our classification of patterns of alcohol use and abuse is that we were unable to model binge-drinking. Unlike recent studies that have attempted to develop an indicator to characterise binge drinking using BCS data (de Coulon et al., 2009), we believe that, because adulthood BCS questionnaires do not indicate amounts drank at each session but only overall consumption and

frequency of drinking in the past week, such analyses are unwarranted. A more general note of caution relates to the fact that we consider self-reported drinking, and self-reports are liable to inaccuracies as heavy drinkers and women tend to under-report alcohol consumption (Conigrave et al., 1995; Wetterling et al., 1998).

44. Overall, our study highlights that the positive effect that education appears to have on health status in general and health behaviours in particular, does not apply to harmful drinking behaviours. While harmful drinking shares several features with other lifestyle choices such as smoking and obesity, the better educated appear to be the ones who engage the most in problematic patterns of alcohol consumption. Greater educational qualifications may lead to greater alcohol related problems, particularly among women. Another important finding is that academic achievement in childhood is associated with a greater likelihood of alcohol abuse. Further research should attempt to examine the association between academic achievement and alcohol use and abuse and should findings estimated in this study be replicated attention should be focused on understanding the mechanisms and pathways through which such relationship could operate.

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